# INTRODUCTION TO MEDICAL SURGICAL NURSING

## MAIN OBJECTIVE:

To acquire knowledge on medical-surgical nursing and develop skills and attitudes in the management of patients with medical and surgical conditions.

## SUB-OBJECTIVES

The student will be able to:

1. Discuss historical development of Medicine and Surgery.
2. Classify the disease/condition according to their etiology.
3. Describe the disease process (*Pathophysiology*)
4. Describe common medical-surgical conditions

# Assignment

1. Write notes on historical development of Medicine and Surgery

# Background

- **Medical /surgical nursing-** broad nursing specialty that provide care for adult patients with either /both acute and chronic conditions.
- This requires broad knowledge on body system, surgical and medical pathologies, clinical skills, clinical decision making as well as collaborative skills.
- According to **Florence Nightingale**, the goal of nursing was

***to put the patient in the best condition for nature to act***

# Cont'----

- **Roles of the Nurse in medical surgical nursing**

➤**Nurse practitioner-** makes interventions, teaches patient, families and communities and also collaborates care

➤**Leadership role-** this role demands ,decision making, facilitation,influencing and relating with other nurses in order to meet patients, families and community health needs.

➤**Reseacher role-** every nurse should participate in research in order to answer the questions and improve on the practice and hence the need to understand research methods

➤**Expanded nursing roles-** an increase in health care demands leads to the need for ability to independent decision making hence the need for specialization e.g critical care nursing, family health nursing, orthopedic nursing among many others.

# Models of Nursing Care Delivery

- Task based/functional nursing
- Primary nursing
- Team nursing
- Case based management
- Community-based /  community health

- **Health care delivery system**

***Changes in delivery of health care have been propelled by:***

- **Demographic changes-** increase in population due to improved health care, expanded lifespan, flexible global movement,urbanization etc
- **Emerging and reemerging diseases**
- **Aging population-** health promotion, disease prevention and rehabilitative services led to prolongation of life as well as reduction in acute ilnesses but an increase in chronic illneses
- **Technological advances-** diagnostic and therapeutic equipments.
- **Economical changes-** high costs of health care

# Concepts and Definition of terms

- **Medicine -** The branch of medical science that deals with nonsurgical techniques of treating illnesses
- **Surgery -** The branch of medical science that treats disease or injury by operative procedures
- **Health**- state of complete physical, mental, and social well-beingand not merely the absence of disease.
- **Sepsis** - presence of pathogens or their toxins
- Surgical asepsis - Condition of being aseptic (sterile) aseptic treatment and technique
- **Aseptic technique** - All steps taken to prevent contamination of surgical site by infectious agents

- **Sterile** - complete absence of microbes via the cleansing process
- **Curettage** - surgery to remove tissue or growths from a bodily cavity (as the uterus) by scraping with a curette
- **Debridement** - surgical removal of foreign material and dead tissue from a wound in order to prevent infection and promote healing
- **Dehiscence** - Bursting open of a wound, especially a surgical abdominal wound

- **Health–Illness continuum** - considers a person as having neither complete health nor complete illness. Instead, a person's state of health is ever-changing and has the potential to range from high-level wellness to extremely poor health status.

- **The patient/client**: the one with health care needs. Care should be focused on the patient /client. Identification of the immediate health care need is a fundamental nursing

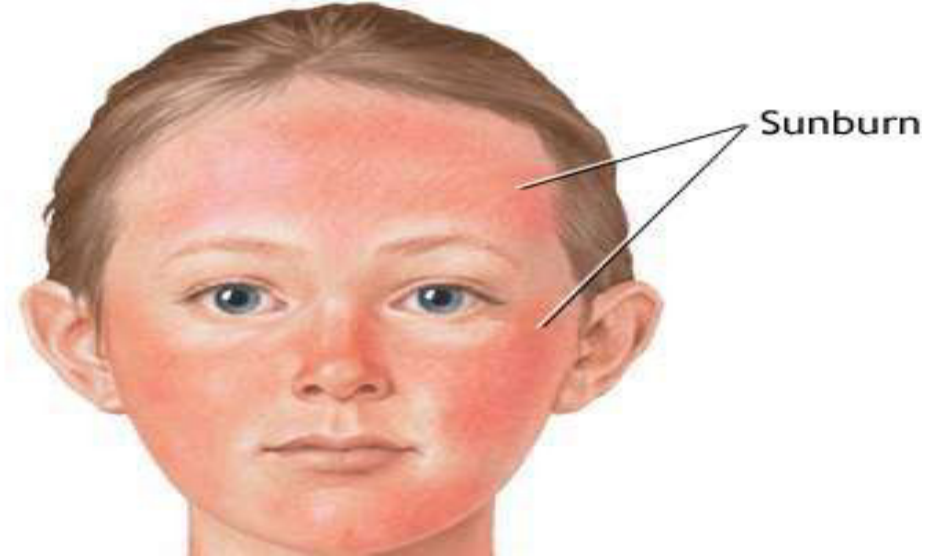
# PROCESS OF INFLAMMATION

# Introduction

## INFLAMMATION:

- **Definition 1**: the local response of living body tissues to injury due to any agent.

- **Definition 2**: The complex biological response of body tissues to harmful stimuli, such as pathogens, damaged cells, or irritants




# Cont..

- Inflammation is a protective response involving;
  - immune cells,
  - blood vessels,
  - molecular mediators

- It is also the body defense reaction – to eliminate or limit the spread of injurious agent

# Causes of Inflammation

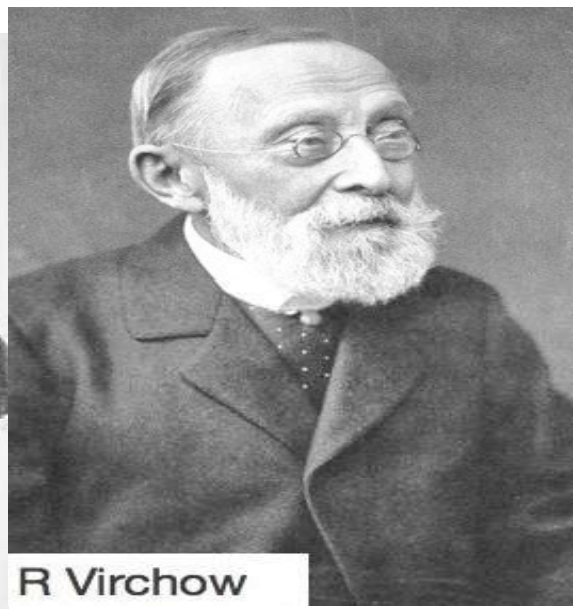
1. *Infective agents* like bacteria, viruses, fungi, parasites (and their toxins).
2. *Immunological agents* like cell-mediated and antigen antibody reactions.
3. *Physical agents* like heat, cold, radiation, mechanical trauma.
4. *Chemical agents* like organic and inorganic poisons.
5. *Inert materials* such as foreign bodies (chemically inactive)

# Signs of inflammation

- 4 cardinal signs (according to Celsus)
  - **Redness**
  - **Swelling**
  - **Heat**
  - **Pain**
- 5th sign

- **Loss of function** – (according to Virchow)


AC Celsus


R Virchow

# Types of inflammation

Mainly of 2 types i.e. acute and chronic

- **Acute Inflammation**
  - short duration
  - represents the early body reaction- followed by healing
- **Chronic inflammation**
  - longer duration
  - causative agent of acute inflammation persists for a long time

# INFLAMMATORY RESPONSE/PROCESS/THE PROCESS OF INFLAMMATION

Involves the following events:

## VASCULAR EVENTS/RESPONSE

a) Hemodynamic changes
b) Altered vascular permeability

## CELLULAR EVENTS/RESPONSE

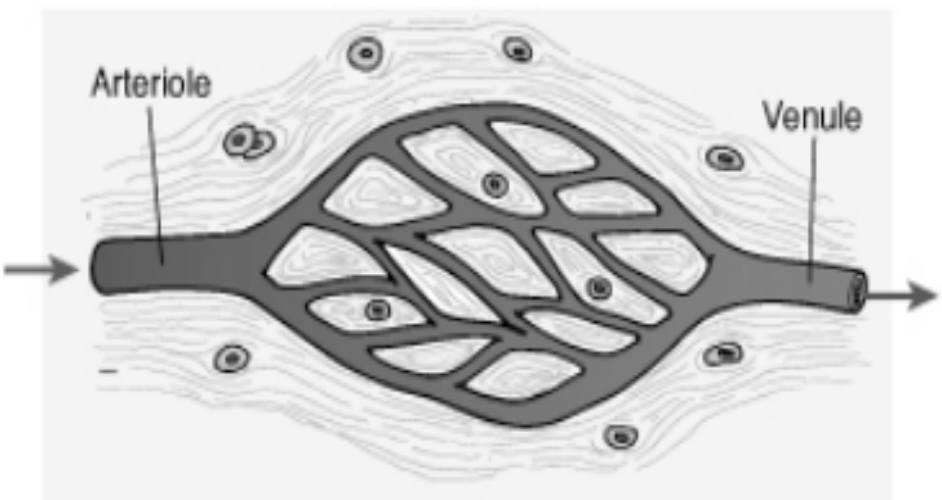
a) Exudation of leukocytes
b) Phagocytosis

# VASCULAR EVENTS/RESPONSE

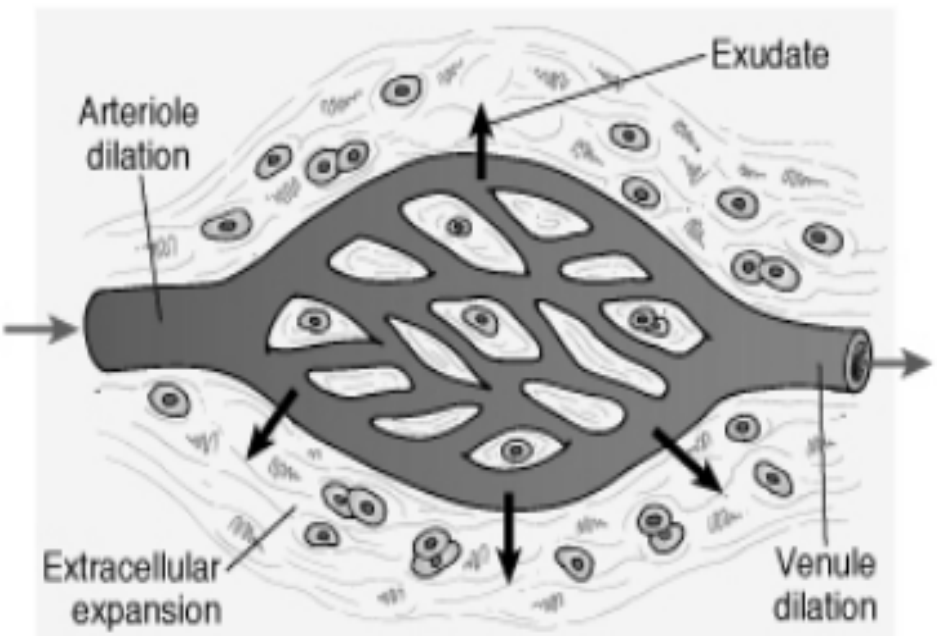
## a) Hemodynamic changes

- **Transient vasoconstriction:** Is the immediate vascular response to achieve hemostasis irrespective of type of injury .
- **Persistent progressive vasodilation:** Involves mainly arterioles but to a lesser extent, capillaries. It results in increased blood volume in the micro-vascular bed of the site of acute inflammation.
- **Elevated local hydrostatic pressure:** Caused by progressive vasodilation which results in transudation of fluid into the local site causing edema

- Slowing/stasis of microcirculation follows, causing increased concentration of RBCs and thus raised blood viscosity.




Normal




Acute inflammation

## b) Altered vascular –permeability

There are two mechanisms –:

- Chemical mediators of acute inflammation may cause retraction of endothelial cells, leaving intercellular gaps (***chemical mediated vascular leakage***).
- Toxins and physical agents may cause necrosis of vascular endothelium, leading to abnormal leakage (***injury induced vascular leakage***).

## CELLULAR EVENTS/RESPONSE

Includes:

### i) Formation of the Cellular Exudate

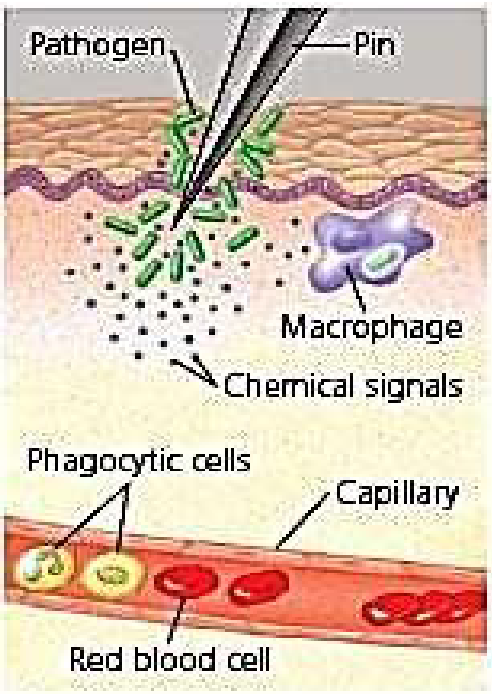
*How do white blood cells get out of the circulation and into the area where they are needed?*

- The movement of leukocytes from the vessel lumen in a directional fashion to the site of tissue damage is called ***chemotaxis***.
- All granulocytes and monocytes respond to chemotactic factors and move along a concentration gradient (from an area of lesser concentration of the factor to an area of greater concentration of the factor).

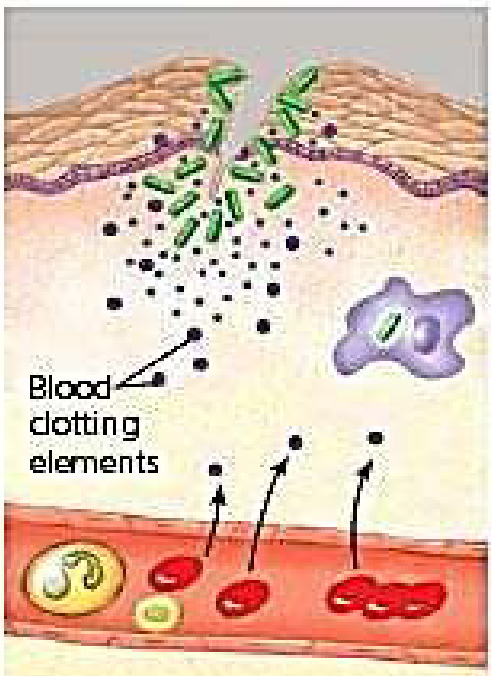
## ii) Phagocytosis

- The process whereby cells ingest solid particles is termed phagocytosis.
- The first step in phagocytosis is adhesion of the particle to be phagocytosed to the cell surface. The phagocyte ingests the attached particle by sending out pseudopodia around it. These meet and fuse so that the particle lies in a phagocytic vacuole (also called a phagosome) bounded by cell membrane. Lysosomes, then fuse with phagosomes to form phagolysosomes. It is within these that intracellular killing of microorganisms occurs.

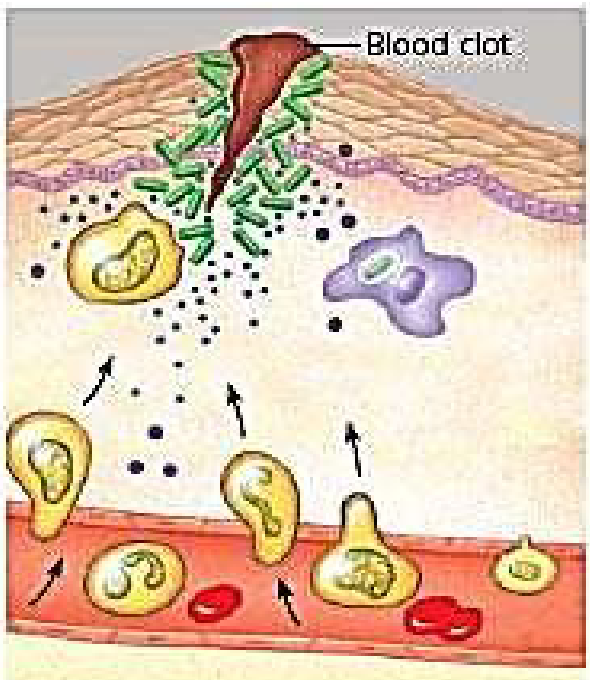
# INFLAMMATION PROCESS;



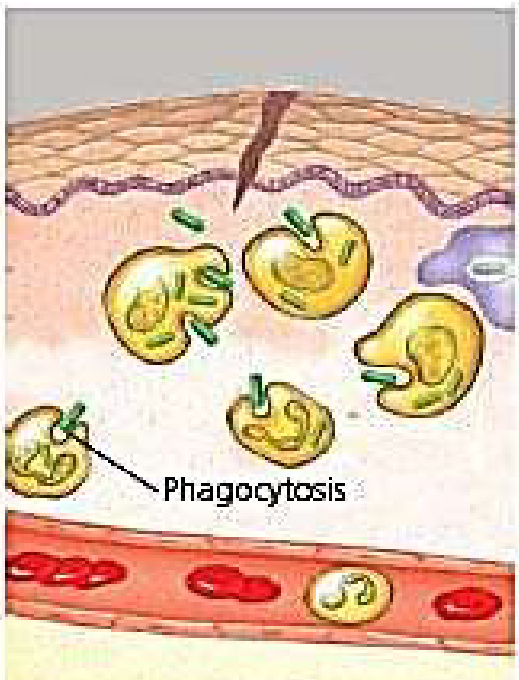

1. Chemical signals released by activated macrophages and mast cells at the injury site cause nearby capillaries to widen and become more permeable.




2. Fluid, antimicrobial proteins, and clotting elements move from the blood to the site. Clotting begins.




3. Chemokines released by various kinds of cells attract more phagocytic cells from the blood to the injury site.




4. Neutrophils and macrophages phagocytose pathogens and cell debris at the site, and the tissue heals.

# Factors that can influence chronic inflammation;

- Dietary factors,
- Physical activity,
- Smoking
- Obesity
- Alcohol consumption
- Stress can affect inflammation.

# DISORDERS OF INFLAMMATION

Inflammatory abnormalities are a large group of disorders that underlie a vast variety of human diseases.

**Examples of disorders associated with inflammation include:**

- Acne vulgaris
- Asthma
- Autoimmune diseases
- Chronic prostatitis
- Diverticulitis
- Glomerulonephritis
- Hypersensitivities

**MANAGEMENT OF PATIENTS WITH INFLAMMATION**

**FEVER/PYREXIA:** Occurs due to bacteremia. Administer prescribed antipyretics e.g paracetamol. Give high calorie diet in the form of carbohydrates. This is to meet the increased metabolic demand in patients with fever.

**LEUCOCYTOSIS:** Usually in bacterial infections there is neutrophilia, viral infections cause lymphocytosis, parasitic infections cause eosinophilia. Administer prescribed antibacterial agents.

**DIET:** Provide easily digestible diet (light diet), keep the fluid balance, and give high protein diet for the formation of new

**SEDATION:** Inflammation will produce pain, therefore sedative drugs may be given to induce sleep.

**SHOCK:** Systematic activation of coagulation pathway may occur leading to microthrombi throughout the body and results into DIC, bleeding and death. Severe tissue injury results in profuse systemic vasodilation, increased vascular permeability and intravascular volume loss causing hypotension and shock. Give plenty of I.V fluids.

**PAIN:** Immobilize the affected limb, administer prescribed analgesics. Give anti-inflammatory agents e.g ibuprofen, indomethacin, steroids e.g prednisone and dexamethasone.

**REST:** Elevate the affected limb. The inflamed part is rested by elevation. In case of arms use splints, and for lower limbs use pillows and clear.

**LOCAL TREATMENT:** If the inflammation is broken and septic, use antiseptics to kill the pathogenic microbes in in the wound. Examples of antiseptics include: hydrogen peroxide, hibitane (Chlorexidine).

# Systemic effects of inflammation

- **Fever :** infectious form of inflammation
- **Anaemia**
- **Leucocytosis**
- Septic shock

# CLASSIFICATION OF DISEASES

# INTRODUCTION

- A **disease** is a particular abnormal condition that affects part or all of an organism and is not caused by external force (injury).
- Disease is often interpreted as a **medical condition** associated with specific symptoms and signs.
- It  may be caused by external factors such as pathogens or by internal dysfunctions, particularly of the immune system, such as an immunodeficiency, or by a hypersensitivity,
  including allergies and autoimmunity.

- Diseases may be classified by cause, pathogenesis or by symptom(s).
- Alternatively, diseases may be classified according to the organ system involved, though this is often complicated since many diseases affect more than one organ.
- The most known and used classification of diseases is the **World Health Organization's ICD (International Statistical Classification of Diseases and Related Health Problems)**. This is periodically updated.

# ICD

- The **International Classification of Diseases** (**ICD**) is the international " standard diagnostic tool
for epidemiology, health management and clinical purposes".
- Its full official name is **International Statistical Classification of Diseases and Related Health Problems.**
- The ICD is designed as a health care classification system, providing a system of diagnostic codes for classifying diseases.
- It contains codes for diseases, signs and symptoms, abnormal findings, complaints, social
circumstances, and external causes of injury or diseases.
- The first international classification edition, known as the **International List of Causes of Death**, was adopted by the International Statistical Institute in 1893.

# Disease classification :

There are four main classes of disease

i. **Genetic disease**
ii. **Infectious disease (infections)**
iii. **Neoplasmic (benign or malignant) disease**
iv. **Traumatic disease (injuries)**

- Diseases can also be classified as communicable and non-communicable.

# i. Genetic disease

- A **genetic disease** is a genetic problem caused by one or more abnormalities formed in the genome.

- Most genetic disorders are **quite rare**

- Genetic disorders may be **hereditary or non-hereditary**, meaning that they are passed down from the parents' genes.
- However, in some genetic disorders, defects may be caused by new mutations, altered phenotype, or changes to the DNA.
- Examples: **albinism, sickle-cell disease, hemophilia etc**

# ii. Infectious disease (infections)

- Infectious diseases are disorders caused by organisms — such as **bacteria, viruses, fungi or parasites**.
- Some infectious diseases can be passed from person to person.
- Some are transmitted by insects or other animals. And one may get others by consuming contaminated food or water or being exposed to organisms in the environment.
- Signs and symptoms vary depending on the organism causing the infection, but often include fever and fatigue.

- Mild infections may respond to rest and home remedies, while some life-threatening infections may need hospitalization.
- Many infectious diseases, such as measles and chickenpox, can be prevented by vaccines.
- Frequent and thorough hand-washing helps to protect individuals from most infectious diseases.

## iii. Neoplasmic (benign or malignant) disease

- A **neoplasm** is a type of abnormal and excessive growth, called **neoplasia**, of tissue.
- The growth of a neoplasm is uncoordinated with that of the normal surrounding tissue, and it persists growing abnormally, even if the original trigger is removed.
- This abnormal growth usually (but not always) forms a mass. When it forms a mass, it may be called a **tumor**.
- ICD-10 classifies neoplasms into the following main groups: benign neoplasms, malignant neoplasms, and neoplasms of uncertain or unknown behavior. Malignant neoplasms are also simply known as cancers and are the focus of oncology.

# Types of neoplasms

- A neoplasm can be benign or malignant (cancer).
- **Benign tumors** include uterine fibroids.
- They are circumscribed, localized and do not transform into cancer.
- **Malignant neoplasms** are commonly called cancer.
- They invade and destroy the surrounding tissue, may form metastases and, if untreated or unresponsive to treatment, will generally prove fatal.
- ***Secondary neoplasm*** refers to any of a class of cancerous tumor that is a metastatic offshoot of a primary tumor.
- If a metastatic neoplasm has no known site of the ***primary cancer***, it is classified as a cancer of unknown **primary**

# iv. Traumatic disease (injuries)

**Trauma** most often refers to:

- **Psychological trauma**, a type of damage to the psyche that occurs as a result of a severely distressing event

- **Traumatic injury**, sudden physical injury caused by an external force, which does not rise to the level of major trauma

# Disease Classification:

The other widely used classifications of disease are :

(1) Topographic, by bodily region or system,
(2) Anatomic, by organ or tissue,
(3) Physiological, by function or effect,
(4) Pathological, by the nature of the disease process,
(5) Etiologic (causal)
(6) Epidemiological

# 1. Topographic classification

- In the **topographic classification**, diseases are subdivided into such categories as gastrointestinal disease, vascular disease, abdominal disease, and chest disease.
- Various specializations within medicine follow such topographic or systemic divisions, so that there are physicians who are essentially vascular surgeons, for example, or clinicians who are specialized in gastrointestinal disease.
- Similarly, some physicians have become specialized in chest disease and concentrate principally on diseases of the heart and lungs.

# 2. Anatomic classification

- In the **anatomic classification**, disease is categorized by the specific organ or tissue affected; hence, heart disease, liver disease, and lung disease.
- Medical specialties such as cardiology are restricted to diseases of a single organ, in this case the heart.
- Such a classification has its greatest use in identifying the various kinds of disease that affect a particular organ.
- The heart is a good example to consider.

# 3. Physiological classification

- The **physiological classification** of disease is based on the underlying functional derangement produced by a specific disorder.
- Included in this classification are such subclasses as respiratory and metabolic disease. Respiratory diseases are those that interfere with the intake and expulsion of air and the exchange of oxygen for carbon dioxide in the lungs.
- Metabolic diseases are those in which disturbances of the body's chemical processes are a basic feature. Diabetes and gout are examples.

# 4. Pathological classification

- The **pathological classification** of disease considers the nature of the disease process.
- Neoplastic and inflammatory disease are examples.
- Neoplastic disease includes the whole range of tumors, particularly cancers, and their effect on human beings.
- Examples of Inflammatory diseases include: appendicitis, cellulitis, otitis media etc

# 5. Etiologic classification

- The **etiologic classification** of disease is based on the cause, when known.
- This classification is particularly important and useful in the consideration of biotic disease.
- On this basis disease might be classified as bacterial (e.g. staphylococcal) or fungal, etc.
- Bacteria for example, cause skin infections, pneumonia, meningitis, abscesses in the liver, and kidney infections.
- Diseases such as amoebiasis (parasitic), chicken pox (viral), tinea capitis (fungal) and gonorrhea (bacterial) are further examples of diseases classified by etiology.

# 6. Epidemiological classification

- The **epidemiological classification** of disease deals with the incidence, distribution, and control of disorders in a population.
- To use the example of typhoid, a disease spread through contaminated food and water, it first becomes important to establish that the disease observed is truly caused by *Salmonella typhi*, the typhoid organism.
- Once the diagnosis is established, it is important to know the number of cases, whether the cases were scattered over the course of a year or occurred within a short period, and what the geographic distribution is.

# COMMON MEDICAL SURGICAL CONDITIONS

# ABSCESS

# Abscess

- **Definition 1:** An abscess is a cavity filled with pus . It contains white blood cells, dead tissue and bacteria.
- **Definition 2:** localized collection of pus surrounded by inflamed tissue

## TYPES OF ABSCESS

- **Abscesses can develop anywhere in the body.**

i. Skin abscesses – which develop under the skin
ii. Internal abscesses – which develop inside the body, in an organ or in the spaces between organs
iii. **Incisional abscess** - An *incisional abscess* is one that develops **as a complication secondary to a surgical incision**.
    - It <u>presents as</u> redness and warmth at the margins of the incision with purulent drainage from it.

- <u>If the diagnosis is uncertain</u>, an abscess should be aspirated with a needle, and the aspirated pus be presented for culture and sensitivity.

# Other abscesses

- There are many other types of abscess, including:
- **Anorectal abscess** – a build-up of pus in the rectum and anus
- **Bartholin's abscess** – a build-up of pus inside one of the Bartholin's glands, which are found on each side of the opening of the vaginal orifice.
- **brain abscess** – a rare but potentially life-threatening build-up of pus
  **inside the skull (cranium)**
- **Dental abscess** – a build-up **of pus under a tooth or in the supporting gum and bone**
- **Quinsy (peritonsillar abscess)** – a build-up of pus between one of the tonsils and the wall of the throat (as complication of

# Causes of abscesses

- **Most abscesses are caused by a bacterial infection, parasites, or foreign substances, but bacteria is most common cause.**
- When bacteria enter the body, the immune system sends infection-fighting white blood cells to the affected area.
- As the white blood cells attack the bacteria, some nearby tissues die, creating a space which then fills with pus to form an abscess. The pus contains a mixture of dead tissue, white blood cells and bacteria.

- **Internal abscesses** often develop as a complication of an existing condition, such as an infection elsewhere in your body. For example, if the appendix bursts as a result of appendicitis, bacteria can spread inside the abdomen and cause an abscess to form.
- The most **common bacterial organism responsible** for the development of skin abscesses is *Staphylococcus aureus*
- With the emergence of methicillin-resistant *Staphylococcus aureus* (MRSA), health care providers must now consider this organism as the possible cause when a skin abscess is encountered.

## Pathophysiology:

- Upon entry of the organisms or foreign materials, *Staphylococcus aureus for example* kills the local cells, resulting in the release of cytokines.
- The cytokines trigger an inflammatory response, which draws large numbers of white blood cells to the area and increases the regional blood flow.
- **The final structure of the abscess** is an **abscess wall, or capsule**, that is formed by the adjacent healthy cells in an attempt to keep the pus from infecting neighboring structures.
- However, such encapsulation tends to prevent immune cells from attacking bacteria in the pus, or from reaching the causative organism or foreign object.

## Signs and Symptoms of skin abscesses:

- A skin abscess often appears as a **swollen**, **pus-filled lump under the surface of the skin.**
- **Body malaise**
- Other symptoms of an infection, such as a **fever,**
- **chills.**
- **warmth**
- **redness** (in the affected area)
- A boil is a common example of a skin abscess.

# common signs and Symptoms of internal abscesses

- The signs and symptoms of an internal abscess can also vary **depending on exactly where in the body the abscess develops.**
- For example, a liver abscess may cause jaundice, whereas an abscess in or near the lungs may cause a cough or shortness of breath.

**General signs and symptoms of an internal abscess can include:**

- Discomfort in the area of the abscess
- Fever
- Increased sweating
- Vomiting
- Chills
- Pain or swelling in the abdomen
- Loss of appetite
- Weight loss
- Extreme tiredness (fatigue)
- Diarrhoea or constipation

## Risk factors:

## You're at increased risk for this bacterial infection if you have:

- Close contact with an individual who has a staph infection, (which is why these infections are more common in hospitals)
- A chronic skin disease, like acne or eczema
- Diabetes
- A weakened immune system, which can be caused by infections such as HIV
- Poor hygiene habits

# Risk factors cont..

## Infected hair follicles (folliculitis)

- Infected hair follicles, or folliculitis, may cause abscesses to form in the follicle. Follicles can become infected if the hair within the follicle is trapped and unable to break through the skin, as can happen after shaving.
- Trapped hair follicles are commonly known as ingrown hairs. Ingrown hairs can set the stage for an infection. Abscesses that are on or in a hair follicle will often contain this ingrown hair.
- Folliculitis may also occur after spending time in an inadequately chlorinated pool or hot tub.

# Investigations

- **When taking** medical history, ask:
    - How long the abscess has been present
    - If they recall any injury to that area
    - What drugs one may be taking
    - If they have any allergies
    - If they had a fever

- Physical exam. Examine the abscess and surrounding areas.
- Take a culture or a small amount of fluid from the abscess to  test for the presence of bacteria

# Difference between cyst and abscess

## CYST

- A cyst is a closed sac that develops abnormally in some body structure

**Symptoms:**

- A cyst grows slowly and isn't usually painful, unless it becomes enlarged.
- When an already-formed cyst becomes infected, it becomes an abscess.
- Not infected.

## ABSCESS

- An abscess is a pus-filled infection in the body caused by, for example, bacteria or fungi.

**Symptoms:**

- Pain, redness, and swelling and can cause symptoms elsewhere in the body.
- An abscess doesn't have to begin as a cyst. It can form on its own.
- An abscess is infected

## Skin abscesses

- Some small skin abscesses may drain naturally & get better without the need for treatment.
- For larger or persistent skin abscesses, a course of **Antibiotics may be prescribed** to help clear the infection and prevent it from spreading.

## Internal abscesses

- The pus usually needs to be drained from an internal abscess, either by using a needle inserted through the skin **(percutaneous abscess drainage) or with surgery.**
- The method used will depend on the size of the abscess and where it is in the body.
- **Antibiotics** will usually be given at the same time, to help kill the infection and prevent it from spreading. These may be given as orally or intravenously.

# Treatment:

- A small skin abscess may drain naturally, or simply shrink, dry up and disappear without any treatment.

- **Abscesses can be treated in a number of different ways, depending on the type of abscess and how large it is.**

- <u>The main treatment options include:</u>
- antibiotics
- a drainage procedure
- warm compress
- Surgery

## Surgery (Incision and drainage)

- If the skin abscess needs draining, the patient will have a minor surgical operation carried out under anesthesia– usually a **local anesthetic**
- During the procedure, an **incision is made** in the abscess, **to allow the pus to drain out.** A sample of pus may also be taken for testing.
- Once all of the pus has been removed, the resulting hole that is left by the abscess is cleaned **using sterile saline (a salt solution**).
- The abscess will be **left open but covered with a wound dressing,** so if any more pus is produced it can drain away easily.

Abscess five days after incision and drainage

# Percutaneous drainage

- If the internal abscess is small, the surgeon may be able to drain it using a fine needle.
- Depending on the location of the abscess, this may be carried out using either a local or general anaesthetic.
- The surgeon may use ultrasound scans or computerised tomography (CT) scans to help guide the needle into the right place.
- Once the abscess has been located, the pus is drained using the needle. A small incision may be made on the skin over the abscess, then insert a thin plastic tube called a drainage catheter into it.

- The catheter allows the pus to drain out into a bag and may have to be left in place for up to a week.
- This procedure may be carried out as a day case procedure, which means the patient may be able to go back home the same day, although some people will need to stay in hospital for a few days.

<u>You may need to undergo surgery if:</u>

i. **Your internal abscess is too large to be drained with a needle**
ii. A needle can't get to the abscess safely
iii. Needle drainage hasn't been effective in removing all of the pus

# Prevention of abscesses

- **Proper hygiene** is the best way to avoid infection.
- **Keep cuts and wounds clean, dry, and covered** to protect them from microorganisms.
- Avoid **sharing clothing, towels, razors, or bed linens with anyone else**.
- When these items get dirty, wash them separately in hot water.
- Wash your hands well and often using soap and water for at least 20 seconds each time. It's OK to use alcohol-based instant hand sanitizers or wipes if you're not near any soap and water.

# CARBUNCLES AND FURUNCLES

# Carbuncles

- **Definition:** A carbuncle is a cluster of boils that have multiple pus “heads.” They’re tender and painful, and cause a severe infection which could leave a scar.
- Other names: Staph skin infection, Carbunculosis

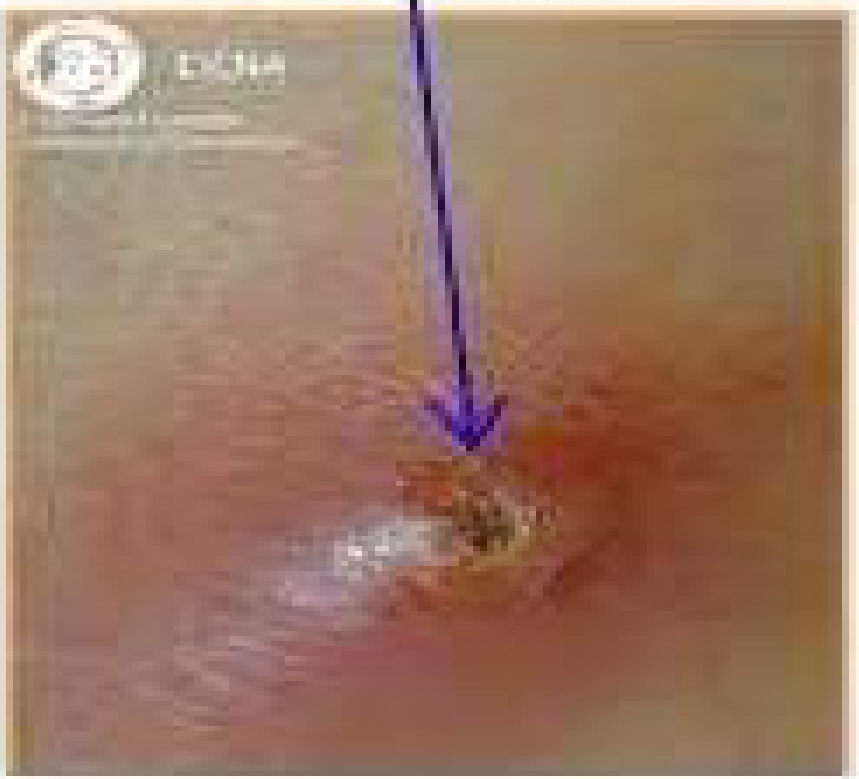
- **A carbuncle is a staph skin infection.**
- Boils: A boil, also called a furuncle, begins as a painful infection of a single hair follicle.
- So carbuncle is multiple furuncles.

# Carbuncles

# Furuncle/Boils

- **Definition:** furuncle, begins as a painful infection of a single hair follicle.
- Furuncles/Boils can grow to be larger than a golf ball, and they buttocks,
face, neck, armpits and groin.

# Furuncle and Carbuncle



Carbuncle : Multiple pointing

- A **hair follicle** is a part of the skin, which grows a hair.
- Attached inside the top of the follicle are sebaceous glands, which are tiny sebum-producing glands in almost all skin except on the palms, lips and soles of the feet.

**Causes:**

- A carbuncle usually develops when *Staphylococcus aureus* bacteria enter the hair follicles.

**Entrance/Portal site:**

- insect bite and broken skin make it easy for bacteria to enter the body and cause an infection.
- This can result in boils or carbuncles (a cluster of boils) filled with fluid and pus.

## Location:

- Carbuncles are common on the back of the neck,  shoulders, or thigh. They can also appear on the face, armpits, or buttocks

## Favourite environment of staph bacteria:

- The moist parts of the body are  particularly susceptible to this infection because bacteria thrive in  these areas where you sweat or experience friction.

## Risk factors:

- Being in close contact with someone who has a carbuncle (the infection can spread when people  share space, materials, or devices, such as clothing)

## The following factors also increase the risk of developing a carbuncle:

- Poor hygiene
- Diabetes (High levels of blood sugar, or glucose, can reduce the immune system's  ability to respond to infection.)
- a weak immune system
- Skin conditions: Psoriasis, eczema, and acne increase susceptibility.
- kidney disease (renal carbuncle may have metastasis
- Medications: Some medications weaken the immune system.

## Signs and Symptoms:

Boils can occur anywhere on your skin, but more likely on hair-bearing areas, where you're most likely to sweat or experience friction. Appear mainly on the face, back of the neck, armpits, thighs and buttocks.

Signs & symptoms include:

- A painful, red bump that starts out small and can enlarge to more than 2 inches (5 centimeters)
- Tenderness
- **Red, swollen skin around the bump**
- An increase in the size of the bump over a few days as it fills with pus

## A carbuncle usually:

- **Develops over several days**
- Have a white or yellow center (contains pus)
- **Weep, ooze, or crust**
- Spread to other skin areas

**Sometimes, other symptoms may occur** including:

- Fatigue
- Fever
- General discomfort
- Skin itching before the carbuncle develops

# Exams and Tests

- The diagnosis may base on clinical examination
- A sample of the pus  may be sent to a lab to determine the bacteria causing the infection  (bacterial culture and sensitivity).
- The test result helps determine  the appropriate treatment.

## Management :

- Warm compresses -
- Warn patient not to squeeze or incise the lesion
- Systemic antibiotics (cloxacillin, erythromycin)
- Bed Rest especially for genital area furuncles.
- For severe pain: ***codeine, morphine***
- **Antibiotics.** Sometimes your doctor may prescribe antibiotics to help heal severe or recurrent infections.
- For larger boils and carbuncles, treatment may include:
- **Incision and drainage.** (when it is fluctuant). **Deep infections** that can't be completely drained may be packed with sterile gauze to help soak up and remove additional pus.

## Lifestyle and home remedies

For small boils, these measures may help the infection heal more quickly and prevent it from spreading:

- **Warm compresses.** Apply a warm washcloth or compress to the affected area several times a day, for about 10 minutes each time. This helps the boil rupture and drain more quickly.
- **Prevent contamination.** Wash your hands thoroughly after treating a boil. Also, **launder clothing, towels or compresses that have touched the infected area.**

## Complications

- Rarely, bacteria from a boil or carbuncle can enter your bloodstream and travel to other parts of your body.
- The spreading infection, commonly known as **sepsis,** can lead to infections deep within your body, such as your heart (endocarditis) and bone (osteomyelitis).

- **Preventions:**
- **Wash your hands regularly with soap.** Or use an alcohol-based hand rub often. **Careful hand-washing is your best defense against germs.**
- **Keep wounds covered. Keep cuts and abrasions clean and covered with sterile, dry bandages until they heal.**
- **Avoid sharing personal items.** Don't share towels, sheets, razors, clothing, athletic equipment and other personal items

# Comparison: carbuncle & furuncle.

## Furuncle

- Begins as a painful infection of a single hair follicle.
- Also known as boil
- Not as deep as carbuncles.
- Furuncles, affect a hair follicle and surrounding tissue.
- This infection is not so deep.
- Furuncles may go away without any intervention. May burst and heal without a scar within 2 days to 3 weeks.

## Carbuncle

- It involves a group of infected hair follicles in one skin location.
- Also known as cluster of boils.
- Is a deeper skin infection
- Carbuncles affect the deeper layers, and they can lead to scarring.
- Carbuncle infections tend to be deeper and more severe
- They take longer to develop and to resolve than furuncles. (often leave a scar)

# CELLULITIS

# CELLULITIS

- Inflammation of subcutaneous tissues as a result of bacterial infection on any part of the body but mostly on lower limbs

## Causative organisms

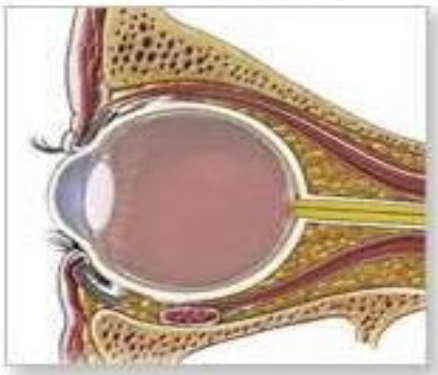
Streptococcus, staphylococus and H. influenzae after gaining entry through bites, breaks in the skin.

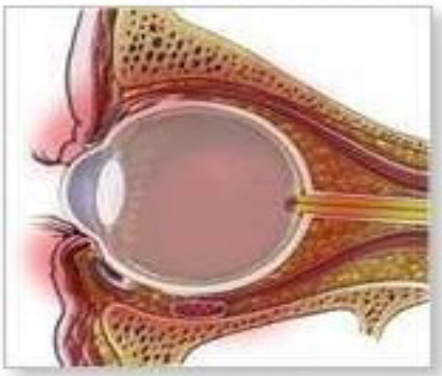
## Risk factors:

- Local trauma (e.g., lacerations, insect bites, wounds, shaving)
- Skin infections such as impetigo, scabies, furuncle, tinea pedis
- Underlying skin ulcer
- Immunocompromised individuals
- Diabetes mellitus


Normal eye

Periorbital cellulitis



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## Pathophysiology

Break on the skin followed by acute inflammatory process that becomes chronic and  may end up as an abcess

## Signs and symptoms

The area is red ,hot and painful in the initial phase. It get swollen later which is  related to inflammation processes

# Medical management

- Identify the port of entry
- Antibiotics – penicillins if no MRSA (methicillin resistant staphylococcus aureus) but if any issue use cephalosporins, erythromycin, clindamycycin for at least 7 days to  prevent recurrence.
- If on limb elevate

# When to give IV not PO?

- Patients with mild infection **------> administer oral antibiotics.**

- **Administer IV if:**
  1. Systemic signs of toxicity (eg, fever >38°C, hypotension, or sustained tachycardia)
  2. Rapid progression of erythema
  3. Progression of clinical findings after 48 hours of oral antibiotic therapy
  4. Inability to tolerate oral therapy
  5. Proximity of the lesion to an indwelling medical device (ex: prosthetic joint)

# Medical treatment for non-purulent cellulitis

**Orals medications:**

1. Clindamycin
2. Amoxicillin PLUS septrin
3. Amoxicillin PLUS  doxycycline
4. Amoxicillin PLUS minocycline

**Intravenous meds**

1. Vancomycin
2. Oxacillin

# Medical treatment for purulent cellulitis and Skin Abscesses

***Start IV Rx, Switch to PO once signs of infection resolved.***

**Orals medications:**

Clindamycin, septrin,  doxycycline, minocycline

**Intravenous meds**

Vancomycin PLUS one of the following:

1. Ampicillin
2. Ceftriaxone + metronidazole
3. Ciprofloxacin +  metronidazole
4. Levofloxacin +  metronidazole

- **PO options after s/s resolution:**
  - clindamycin, SEPTRIN, or tetracyclines (doxycycline or minocycline)

- **Duration of treatment:**
- In general ----> 5 days

- **Up to 14 days if:**
  1. Severe infection
  2. Slow response to therapy
  3. Immunosuppression

# Non-pharmacologic Interventions

- Apply warm or, if more comfortable, cool saline compresses to affected areas QID for 15 minutes.
- Mark border of erythema with pen to monitor spread.
- Elevate, rest and gently splint the affected limb.

## Nursing management

Assess the patient

subjective data may include

- Pain
- Chills
- Headache
- Nausea

Objective data

Redness/tenderness  Swelling

Warmth on the tisses affected

# Nursing Diagnosis

- Acute pain related to tissue inflammation as evidenced by patient's verbalization/ body expression/ tarchycardia

## Interventions

- Rate the pain by the scales
- Administer analgesics as prescribed
- Use other pain relieving measures such as elevation of limb/ rest the limb
- Impaired tissue integrity (subcutenous )related to microbial invasion as evidenced by swelling, redness and tenderness

# Interventions

- Placewarm moist cloths on the swollen area
- Give antibiotics
- Administer pain relieving drugs as prescribed
- If on lower limb elevate the leg
- Monitor the progress

# Complications:

1. Bacteremia
2. Endocarditis
3. Osteomyelitis
4. Sepsis

# LYMPHANGITIS

# LYMPHANGITIS

- Acute inflammation of the lymphatic channels.
- **Causative organisms- Hemolytic streptococcus, staph aureus, pseudomonas, fungi**

## Signs and symptoms

- ❖ Focal point –a skin lesion or wound
- ❖ Tender red streaks radiating from the wound towards nearest lymph node
- ❖ Fever, chills
- ❖ General malaise
- ❖ Swollen lymph nodes

## Medical management

**As outpatient or if severe as in patient**

- Antibiotics
- Antinflammatory agents
- Analgesics
- Hot moist compressions on affected areas
- Drainage of abscess if any

## Nursing management

Manage Pain, Fever, General malaise

## Lymphangitis can spread quickly, leading to complications such as:

- Cellulitis
- Bacteremia
- Sepsis,
- Abscess

# SEPTICAEMIA

# SEPTICAEMIA

- **Definition:** Infection in the bloodstream also refered to as bacteremia

**Causes**

Results from other outbrown focal infections e.g. Lungs, urinary system or introduced through invasive procedures

# CAUSATIVE ORGANISMS

- Staphylococcus
- Streptococcus
- Pseudomonas
- Escherichia coli (E.coli)

## Pathophysiology

Entry of bacteria into the blood stream, Triggers an immune response, inflammatory  process, leading to shut down of infection fighting system and shock then death

# CLINICAL MANIFESTATIONS

## Early symptoms include:

- Fever/hyperthermia
- Rapid breathing rate (tachypnea) or shortness of breath.
- Rapid heart rate (tachycardia)
- Low blood pressure
- Anxiety
- Reduced urine output/oliguria
- Malaise
- Loss of appetite, nausea and vomiting.

**As the septicaemia progresses, the symptoms become more severe and includes:**

- Change in mental status,
- Delusions
- coma.
- Red spots on the skin (petechiae) due to blood clotting problems.

# DIAGNOSTIC TESTS

- Blood culture to detect the causative organism
- Blood gases analysis
- Complete blood count (CBC)
- Clotting studies
- CSF Culture
- Culture of any suspected skin lesions

# NURSING DIAGNOSES

- Ineffective tissue perfusion related to contracted peripheral capillaries as evidenced by pale/cold clammy skin/ tarchycardia/confusion
- Hyperthermia related to increased metabolic rate as evidenced by patient verbalization / sweating / vital sign reading
- Anxiety related to unknown outcome.
- Risk for fluid volume deficit related to hyperventilation
- Risk for altered nutrition: less than body requirements related to loss of appetite.

# MANAGEMENT / TREATMENT

- Antibiotics
- Analgesics/Antipyretics
- Blood transfusion if the patient is anemic.
- Oxygen administration
- Fluid replacement
- Provide adequate nutrition
- Preventive measures for pressure ulcers.

# PREVENTION

- Can be prevented by appropriately treating the infections which often precede it. Treat bacterial infections thoroughly to minimize the risk of spread.
- Good personal hygiene
- Use sterile instruments during invasive procedures.
- Immunize children against Haemophilus influenza B (HIB), and pneumonia to reduce cases of septicaemia in children.

# Medical management

- Investigations- Fbc, blood culture,urine culture, L/ punture
- Admit patient
- Iv fluids
- Oxygen if necessary
- Broad spectrum antibiotics

BURN
S

# BURNS

- Destruction of the skin by heat leading to a loss in fuction of the skin as a  barrier

## Causes

- Open fire,
- Hot liquds,
- Chemicals
- Electrical causes

## Pathophysiology

- After destruction of skin there is a marked loss of fluid from the body of about 10-20 times more through evaporation and damage of the blood vessels.
- The trauma of the burn triggers an inflammatory response that increases vessel permeability leading to increase in fluid loss (both salt, water and proteins) leading to burn wound edema that is worst in the first 72hrs
- Loss of skin barrier to microorganisms combined with the immunosuppression leads to increased bacterial proliferation and infection with gram +ve and later gram –ve leading to other infections e.g pneumonia, septicemia and wound infections

## Signs and symptoms

Depends with type and degree of burns

# Classification

### FIRST-DEGREE BURN:

- Confined exclusively to the outer surface and is not considered a significant burn.
- No barrier functions are altered.
- The most  common form is a Sunburn which heals by itself in less than a week  without scar.

## Superficial Second-Degree Burn:

- Involves the entire epidermis and no more than the upper third of the dermis.
- Rapid healing occurs in 1-2 weeks, because of the large amount of remaining skin and good blood supply.
- Scar is uncommon.
- Initial pain is the most severe of than any other burn, as the nerve endings of the skin are now exposed.

# DEEP SECOND DEGREE BURN:

- Most of skin is destroyed except for small amount of remaining dermis.
- The wound contains some dead tissue.
- Blood flow is compromised and a layer of dead dermis or eschar adheres to the wound surface.
- Pain is much less as the nerves are actually destroyed by the heat.
- Usually, one cannot distinguish a deep dermal from a full thickness (third degree) by visualization.
- The presence of sensation to touch usually indicates the burn is a deep partial injury.

# THIRD DEGREE (FULL THICKNESS) BURN:

- Both layers of skin are completely destroyed leaving no cells to heal.
- Any significant burn will require skin grafting.
- Small burns will heal with scar.
- Complete destruction of both layers
- High risk for infection and needs to be excised and skin grafted

# 4TH DEGREE

- Burns involves tissues beyond the dermis such as muscles, tendons, bone, etc
- Note that electrical and chemical burn superficial appearance does not  show the depth and how much the underlying tissues are destroyed

## Medical management

An emergency approach

•Primary survey-

A Airway
B Breathing
C Circulation
D Disability
E Exposure
F Fluid resuscitation

- Secondary survey-mechanism of injury
    - Head to toe exam- All body systems
    - Burnt surface area
    - Burn wound depth

## Investigations

- Blood Gas Analysis
- F/hemogram
- Urea/Electrolytes/Creatinine
- LFTS
- Total Protein and Albumin

## Treatment

- Fluid resuscitation
- Pain mangement
- Wound management
- Prophylactic antibiotics

## Nursing management (consider the following)

- Manage according to nursing assessment (use nursing process)
- Assess Level of injury
- Assess Level of consciousness
- Assess Type of burns

# Fluid resuscitation

➤IV volume must be maintained following a burn in order to provide sufficient circulation to perfuse not only the organs but also the peripheral tissues, especially damaged skin

➤Iv resuscitation is appropriate for any child with a burn greater
Then 10% and 15% for TBSA for adults

➤Most common fluid used is **ringer‘s lactate**

➤Fluid volume is relatively constant in proportion to the area Of body burned. Therefore there are formulae that calculate the approximate volume of fluid needed for the pt of a given Body weight with a given % of the body burned

- **Formulas to calculate the fluid replacement**

1. **Parkland regime / formula (commonly used).** Also known as **Baxter formula**
2. Evan's formula
3. Muir and barclay
4. Modified brook formula

## The formula

The Parkland formula for the total fluid requirement in 24 hours is as follows:

4ml x TBSA (%) x body weight (kg);

50% given in first eight hours;
50% given in next 16 hours.

## Children receive maintenance fluid in addition, at an hourly rate of:

4ml/kg for the first 10kg of body weight plus;
2ml/kg for the second 10kg of body weight plus;
1ml/kg for >20kg of body weight.

## Fluids used
## Crystalloid resuscitation

1. **Ringer lactate** is the most commonly used crystalloid
➤These are as effective as colloids for maintaining intra--vascular volume
➤Less expensive

2. **Hypertonic saline**
➤it produces hyperosmolarity and hypernatremia
➤Reduces shift of intracellular water to extracellular space

➤**Advantage -** Include less tissue oedema

# Colloid resuscitation

➤**Colloids** are gelatinous solutions that maintain a high osmotic pressure in the blood.

➤Examples of **colloids** are

- ❖Albumin,
- ❖Dextran,
- ❖Hydroxyethyl starch (or hetastarch),
- ❖Haemaccel
- ❖Gelofusine

# Why are Crystalloids used instead of colloids for fluid resuscitation?

- **Crystalloids** have small molecules, are cheap, easy to **use**, and provide immediate **fluid resuscitation**, but may increase oedema .

- **Colloids** have larger molecules, cost more, and may induce allergic reactions, blood clotting disorders, and kidney failure

# Monitoring of resuscitation

- The key to monitoring of resuscitation is **urinary output**
- Output should be between 0.5ml and 1.0ml/kg/hour
- If urine output is below this, the infusion rate should increase By 50%
- If still output is inadequate then a **bolus of 10ml/kg** given
- 2ml/kg/hr urinary output signals decrease in the rate of tissue Perfusion
- **Haematocrit measurement** is a useful tool in confirming Suspected under or overhydration

# Treating the burn wound

## Open method

- Silver sulfadiazine application without dressings commonly Used in burns of face,head and neck.

## Closed method

- Dressing done to soothen and to protect the wound
- To reduce the pain
- As an absorbent

# Dressings

- Paraffin gauze
- Hydrocolloids ( e.g duoderm)
- Full-thickness and deep dermal burns need antibacterial dressings to delay microbial colonisation prior to surgery

# Tangential excision

- Can be done within 48 hours with skin grafting in patients with less than 25% burn
- Usually done in deep dermal bu
- Dead dermis is removed layer l occurs
- Later, skin grafting done

# Escharotomy

- ***Circumferential full-thickness burns*** to the limbs require emergency Surgery
- The tourniquet effect of this injury is easily treated by incising the whole length of full-thickness burns. (done avoiding major Nerves)
- Full thickness burns and deep partial-thickness burns that will require operative treatment will need to be dressed with an antibacterial dressing to delay the onset of colonisation of the wound by microorganisms

**A full-thickness burn to the upper limb with a mid-axial  escharotomy.**

The soot and debris have been washed off.

# Superficial partial thickness burns

**After 24 hours after burn**

**After 2 weeks**

**Superficial partial thickness burn after 3 months**

Pigment returning

# Effects of burns

- Shock due to hypovolaemia
- Renal failure (toxins from burn)
- Pulmonary oedema, resp infections, Acute resp. distress syndrome, resp failure, Infection by staph aureus, pseudomonas, etc leads to Septicemia
- Fungal and viral infections may also occur.
- Fluid and electrolyte imbalance.
- Immunosuppression predisposes to severe opportunistic infection.
- Eschar formation and its problems e.g. ischaemia when it is circumferential. (eschar is a dry, dark scab made of dead skin)
- Electrical injuries often cause fractures, major internal organ injury, convulsions

# Effects of burn (cont.....)

- Inhalation burn causes pulmonary oedema, respiratory arrest
- Severe malnutrition with catabolic status,
- **Toxic shock syndrome: It is a life-threatening** exotoxin mediated disease caused by *Staphylococcus aureus. It is common in children, presents with* rashes, myalgia, diarrhoea, vomiting, and multiorgan failure with high mortality
- Development of contracture is a late problem. It may lead to disability of different joints, defective hand functions, growth retardation causing shortening etc

# COMPLICATIONS OF BURNS CONTRACTURES

- Ectropion of eyelid ( eyelid turns outward) causing keratitis and corneal ulcer.
- Disfigurement in face.
- Narrowing of mouth (**microstomia).**
- Contracture in the neck causing restricted neck movements.
- Disability and nonfunctioning of joints due to contracture

# Contracture

**Severe contracture at knee joint  causing deformity**

# Complication of contracture

## Hypertrophic scar

# Treatment of burn contracture

- Release of contracture surgically and use of skin graft.
- Proper physiotherapy and rehabilitation is essential.
- Management of itching in the scar using  antihistamines and moisturizing creams.

# Prevention of development of contracture

- Joint exercise in full range during recovery period of burns

# ASSESSEMENT OF TOTAL BODY SURFACE AREA (TBSA) FOR BURNS

## METHODS

i. By depth

ii. Rule of 9 -Estimated percentage of total body surface area (TBSA) in the adult is arrived at by sectioning the body surface into areas with a numerical value related to nine. . Head-9%, trunk anterior and posterior 36%,upper limbs 18%, lower limbs 36%, gentalia1%. Any burn with above 25% provokes a systemic response. The patient's palm for small burns- 1%

iii. Lund and Browder chart – allocates percentage as per the

# WOUND HEALING

# WOUND HEALING

Wound healing is a mechanism by which the body attempts to restore the integrity of the injured part.

## Factors influencing healing of a wound

- Site of the wound
- Structures involved
- Mechanism of wounding
- Type of  incision
- Contamination (foreign bodies/bacteria)
- Loss of tissue on the wound

# Cont'-----

## Local factors

- Vascular insufficiency (arterial or venous)
- Previous radiation

## Systemic factors

- Malnutrition or vitamin and mineral deficiencies
- Disease (e.g. diabetes mellitus)
- Medications (e.g. steroids)
- Immune deficiencies[e.g. chemotherapy, acquired immunodeficiency syndrome (AIDS)]
- Smoking

## Types of wounds

- Surgical- created intentionally to attend to a pathology
- Traumatic wounds- accidental wounds e.g burns, crush, cuts etc
- Chronic – develop due to chronic conditions e.g pressure ulcers, skin conditions, abscesses etc (more classifications exist)

Healing may occur in one of the following:

## 1. Healing by Primary intention

- Healing through primary intention occurs when wounds are created aseptically, with a

# Conditions in healing by primary intention

- Edges of an incised wound in a healthy individual are promptly

and accurately approximated.

- Contamination is held to a minimum by rigid adherence to
- aseptic technique.
- Trauma is minimal.
- No tissue loss occurs.
- On completion of closure, no dead space remains to become a potential site of infection.
- Drainage is minimal.

# Cont---

## 2. Healing by secondary intention

- These type of wounds are characterized by tissue loss with an inability to approximate wound edges.
- The woundheals from the inside toward the outer surface.
- In infected wounds this process allows cleaning and dressing.
- Healing is by granulation and eventually there is scarring .
- These type of wounds include chronic , septic and traumatic wounds

## 3. Healing by tertiary intention

- Occurs when approximation of wound edges is intentionally delayed  by 3 or more days after injury or surgery.
- This could be due to heavy contamination of wound or condition of patient.
- Debridement may be done then wound closed later

# Phases of wound healing

i. **Hemostasis** – Contraction of carpillaries to stop the bleeding

ii. **Inflammatory**(Reactive ) – A **vascular** and **cellular** response to dispose off bacteria, foreign material and dead tissue.

- ✔ Leukocytes (Neutrophils, Monocytes and macrophages) increase in number to fight bacteria in the wound area and by phagocytosis, help to remove damaged tissues, and foreign bodies.
- ✔ There is also an increase in platelets.

## Cont,.

- ✔ The vascular response is about dilatation of blood vessels to allow permability of exudate for supply of more oxygen, plasma proteins and bradykinins for healing process. This causes redness, local warmth, and swelling.
- ✔ The damaged tissue is glued together by strands of fibrin and a thin layer of clotted blood, forming a scab. Plasma seeps to the surface to form a dry, protective crust. This seal helps to prevent fluid loss and bacterial invasion.

iii. **Proliferative**(Regenerative )

- Epithelial cells migrate and proliferate to the wound area, covering the surface of the wound .
- Collagen synthesis, deposit and contraction of the wound occur in this phase. Underneath the epithelium layer, granulation continues. Epithelialization is limited to small wounds while larger ones may require grafting.

iv. **Remolding(Maturation)**

- The phase starts 2-4 wks after injury and may continue for years.
- There is deposition of collagen fibres and breakdown of earlier deposits, as well as realignment of the fibres till the

SHOC
K

# SHOCK

- **Definition:** Shock is a systemic state of low tissue perfusion, which is inadequate  for normal cellular respiration.

- **With insufficient delivery of oxygen and glucose, cells switch from aerobic to anaerobic metabolism. If perfusion is not restored in a timely fashion, cell  death occurs.

# Classification of shock

- **Hypovolaemic**- caused by a reduced circulating volume.
- **Cardiogenic**- failure of the heart to pump out enough blood to the tissues.
- **Obstructive**- there is a reduction in preload because of mechanical obstruction of cardiac filling e.g pulmonary /air embolism
- **Distributive**- include septic, neurogenic, anaphylactic and endocrinogenic causes

# Signs and symptoms of shock

## General S&S

- Confusion and weakness
- Low blood pressure
- Decreased urine output
- Tachycardia (a fast heart rate)
- Rapid, shallow breathing
- Cold, clammy skin
- Rapid, weak pulse
- Dizziness or fainting
- Weakness

# Stages of shock

## i) Compensatory stage

- **The body tries to compensate for the low blood volume by:**
  - ➤Contactibility of heart
  - ➤Peripheral vasoconstriction
  - ➤Reduced urine output

**Signs and symptoms** of this stage may include:

- Normal BP, tarchycardia, hypervetilation,raised pH level, confusion or anxiety, cold  clammy skin. etc

## ii) Progressive stage

**Characterised by:**

- Failed cardiac ability of meet the demand and myocardial ischemia and hypoperfusion of all organs
- Systemic vasodilation as a result of release of chemical mediators into blood stream

## Signs and symptoms in this stage:

- Slow heart rate of below 60 beat /min
- Low BP below 90mmhg
- Rapid and shallow respirations
- Crackles due to fluid in the lungs
- Unconcious state
- Stress ulcers may lead to intestinal bleeding
- Signs of acute renal failure
- Raised bilirubin levels
- Low ph
- Jaudice
- Tissue oedema

## iii) Irreversible stage

- Most of the organs are damaged beyond repair and death is likely.
- Signs and symptoms remain as those of the progresive phase.

# MANAGEMENT OF SHOCK

- Depending on the type or the cause of the shock, treatments differ.
- In general, fluid resuscitation (giving a large amount of fluid to raise blood pressure quickly) with an IV in the ambulance or emergency room is the first-line treatment for all types of shock.
- The doctors or nurses will also administer medications such as epinephrine, norepinephrine, or dopamine to the fluids to try to raise a patient's blood pressure to ensure blood flow to the vital organs.
- Tests (for example, blood tests, EKGs) will determine the underlying cause of the shock and uncover the severity of the

# Rx

- **Septic shock** is treated with prompt administration of antibiotics depending on the source and type of underlying infection.
- These patients are often dehydrated and require large amounts of fluids to increase and maintain blood pressure.

- **Anaphylactic shock** is treated with diphenhydramine (Benadryl), epinephrine, steroid medications methylprednisolone

# Rx

- **Cardiogenic shock** is treated by identifying and treating the underlying cause.
- A patient with a heart attack may require cardiac catheterization to unblock an artery.
- A patient with congestive heart failure may need medications to support and increase the force of the heart's beat. In severe or prolonged cases, a heart transplant may be the only treatment.

- **Hypovolemic shock** is treated with fluids (saline) in minor cases, but may require multiple blood transfusions in severe cases. The underlying cause of the bleeding must also be identified and corrected.

- **Neurogenic shock** is the most difficult to treat.
- Damage to the spinal cord is often irreversible and causes problems with the natural regulatory functions of the body.
- Besides fluid monitoring:
    - ✔ Immobilization (keeping the spine from moving),
    - ✔ Anti-inflammatory drugs such as steroids
    - ✔ Sometimes surgery are the main parts of treatment.

# Nursing management

- In CCU setting
- Monitoring – hemodynamic monitoring( ECG, ABGs, renal function tests  Etc)
- Cordination  of Collaborative management
- Administration of drugs and fluids
- Family involvement
- Documentation of care

# FLUID AND ELECTROLYTE IMBALANCE

(60% of body wt is made up of fluids )

# FLUID AND ELECTROLYTE IMBALANCE

## Fluid compartments

- **Extra cellular**
- Intravascular
- interstitial
- **Intracellular** (within the cells)
- **Transcellular** –(cerebrospinal, pericardial, synovial, intraocular, and Pleural spaces)
- **Third space-** abnormal amount of fluid trapped in peritonial, plueral or other tissues.

- To maintain homeostasis the body regulates the output to match the input by the renal system, adrenal glands, pituitary glands ( renin, angiotensin  II, aldosterone and ADH)

# A. FLUID IMBALANCE

## CAUSES

**Fluid volume deficit: caused by:**

- Trauma- burns, excessive bleeding
- Diseases such as diarrheal, systemic dieases leading to third spacing. Eg. Ascites, pleural effusion, edema, internal heamorrhage etc
- Insufficient intake
- Renal disease
- Congestive cardiac failure
- Diabetis mellitus,
- Diuretic overuse

# Effects of imbalances

- Low fluid volume - poor cardiac output- poor tissue perfusion - shock
- Poor cell metabolism
- Reduced skin targor, muscle clamps, dizziness, hypotension, peripheral constriction, reduced renal output, sunken eyes, nausea, lethargy, confusion , acute brain failure and  ureamia

## Management

- Fluid replacement – oral or intravenous
- Transfusion – whole or plasma depending with what was lost
- Over a litre – give colloids e.g dextran hemacel etc
- Treat underlying conditions

Fluid overload is rare in a functioning renal system but could be related to other sytemic illnesses e.g CCF.

# Fluid volume excess: caused by

- **Administration of Excessive amounts of hypo- osmolar fluids- e.g** 0.45% Saline/ 5% Dextrose in water.
- Excessive intake of fluid
- Inability to excrete excess water(Renal)
- Poor sodium intake
- Use of diuretics
- Loss of sodium and water& replaced only by water
- Fluid overload i.e., waterand sodium retention.
- Stressful conditions cause **increase in release of ADH and aldosterone** which increases water reabsorption from renal tubules.

# Clinical manifestations

1. **CerebralEdema-** Behavioral changes, headache Inc. ICP, & pupillary changes

2. **Vital Signs alterations-**

- Bradycardia
- Increased systolic B.P.
- Increased respiration
- Pulse?

# Clinical manifestations

## Others-

- Nausea
- Projectile vomiting
- Irritability
- Disorientation
- Confusion
- Drowsiness
- Decreased co-ordination
- Increase in weight
- Convulsions.

# Clinical manifestations

- Peripheral or generalized oedema
- Circulatory overload causes:
    - Bounding pulse
    - Distended neck and peripheral vein
    - Cough , dyspnoea , orthopenea
    - Crackles in lungs
    - Increased urine output
- Ascites
- Altered mental status and anxiety

# Lab findings

- Serum sodium level
- Decrease hematocrit value.

# Management

1. **Medication: Diuretics**- commonly used to treat fluid volume excess.

- They inhibit sodium and water reabsorption, increasing urine output.

- **LOOP DIURETICS:** Furosemide [Lasix].
- **THIAZIDELIKE DIURETICS:** Chlorothiazide [Diuril].
- **POTASSIUM SPARING DIURETICS:** Spironolactone [Aldactone]

2. **Fluid Management:**

- Fluid intake may be restricted to client having fluid volume excess.

3. **Dietary management:**

Because sodium retention is a primary cause of fluid volume excess, so **sodium restriction diet** is often prescribed.

- Check- Reflexes and pupillary response.
- Monitor I/V therapy hourly.
- Check weight daily.
- Safety measures- ifclientshows behavioral changes.

# NURSING MANAGEMENT

- **Assessment**

- Assess early signs of cerebral edema and Increased intracranial pressure.
- Assess absence of thirst, Decreased hematocrit, & Serum Sodium levels.

# NURSING DIAGNOSIS

1. **Excess fluid volume:**

- Assess vital signs, heart sounds and BP.
- Assess for the presence of edema.
- Obtain weight daily at same time of day.
- Provide oral hygiene 2hourly.
- Teach client about sodium restricted diet.
- Report significant changes in serum electrolytes.
- Administer oral fluids cautiously
- Administer diuretics as prescribed.

## 2. Risk for impaired skin integrity :

- Assess skin in pressure area and over bony prominences.
- Change position of client 2 hourly.
- Provide alternating pressure mattress, foot cradle, heel protectors, to reduce pressure on tissues.

## 3. Risk for impaired gas exchange:

- Auscultate lungsfor presence of wheezes and crackles.
- Placein fowler's position ifhaving dyspnea or orthopenea.
- Monitor oxygen saturation level and ABG's.
- Administer oxygen as indicated.

# B. ELECTROLYTE IMBALANCE

Electrolyte functions:

- Transmission of neural impulses
- Muscle contraction and majorly the cardiac muscle( myocardium)
- Body fluid movement & retention- intra /extracellular compartments
- Acid-base balance

**In cases of imbalance of electrolytes then the transmission of impulses and muscle contraction is affected

# Most important electrolytes

- Na- extra cellular-135 - 142 mmol/l
- K- intracellular 3.5 - 5.5mmol/l
- Ca- extra cellular-2.15 – 2.5 mmol/L
- Mg- intracellular-0.65 – 1.25mmol/l
- Cl – extra cellular-97–107 mmol/L
- Phosphorus- intracellular-0.87–1.45mmol/l
- Hydrogen carbonate- extracellular- 110-124mmol/l

Imbalances may occur when there is loss or retention as a resu

# Hyponatremia

- Sodium level lower than 135mmol/l

## Causes:

- Diarrhea,
- Vomiting,
- Excessive sweating,
- Impaired kidneys,
- Addison’s disease (insufficient production of aldosterone) ,
- Overuse of diuretics,
- Excess water retention

## Effects

- Blood volume is low,
- Hypotention abdominal muscle cramps,
- Nausea,
- Fatigue,
- In severe cases: confusion, muscle twitching and convulsions.

## Management

Normal diet with salt if not severe, Iv N/s (restriction of fluids if causes
related to fluid retention), salt tablets,

- Close monitoring of serum levels



- Management of systemic conditions

# Hypernatremia

## Caused by:

- Reduced water intake,
- Cushings syndrome,
- Fasting,
- Vomiting,
- Burns,
- Hypertonic solutions such as 4.5% N/S etc

# Effects

- Thirst,
- Nausea and vomiting,
- Confusion
- Lethargy and weakness,
- Hallucination in severe cases
- Peripheral and pulmonary edema,
- Postural hypotension

# Management

- Treat the cause e.g. Give water or fluids with low sodium (hypotonic solution) with care not to bring down the levels so fast which may lead to brain  edema.
- Promptly manage systemic causes.
- Monitor the serum sodium levels

# Cont'---

## Hyperkalemia

Potassium levels above 5.5 mmol/l

**Causes:**

- Hemolysis due to trauma,
- Renal failure,
- Acidosis and physiologically after exercises,
- Iatrogenic causes (treatment related, potassium chloride, heparin, ACE inhibitors, nsaids, and potassium-sparing diuretics)

## Effects

- Muscle weakness, at times paralysis,
- ECG changes such as narrow T waves and a shortened QT interval.
- Nausea,
- Diarrhea.

# Management

- Monitor Serum potassium levels  and ECG changes
- Restriction of dietary potassium for patients using potasium retention  diuretics
- Calcium gluconate intravenously ***(Ca salts antagonize the effects of potassium in cells)***
- Continous monitoring of patient on ECG

# Hypokalemia-

Serum potasium below 3.5mmol/l

## Causes

- Diarrhea
- Vomiting,
- Ileostomies,
- Metabolic alkalosis,
- Prolonged intestinal suctioning,
- Hyperaldostronism,
- Potassium-losing diuretics,
- Elderly,

# Signs and symptoms

- Fatigue ,
- Anorexia,
- Nausea,
- Vomiting,
- Muscle weakness,
- Leg cramps,
- Paresthesias (numbness and tingling),
- ECG changes - flat T wave

## Management

- If not severe, dietary measures could elevate the levels
- If severe ( below 2mmol/l) then intravenous infusions with potasium is  administered with care and should be at 10-20mmol/hr and not more
- ECG monitoring
- Serum potasium monitoring

## Read and make notes on hypo/hypercalcemia, hypo/hypermagnesia and  hyper/hypo phosphatemia**

# ACID-BASE IMBALANCE

# Acid-Base Imbalance

- The imbalance is measured as per the serum pH level which is basically a measure of acidity.
- Normal serum pH is **7.35-7.45**

## Types of imbalances

**Acidosis**- a state when the PH level in the blood is below 7.3 and the alkaline buffers eg. Sodium bicarbonate has been used up.

**Alkalosis** – the ph level of blood is above 7.5 and the acidic reserve is used up.

The buffer system, kidneys and lungs are unable to contain the situation of regulating the pH therefore the 2 states develop.

**Clinically, the following scenarios are significant:**

a) Metabolic acidosis

b) Metabolic alkalosis

c) Respiratory acidosis

d) Respiratory alkalosis

## a) Metabolic acidosis

- Can be acute or chronic.
- A state where there is low pH and low  bicarbonate in serum

## Causes

- Ketoacidosis,
- Lactic acidosis,
- Late phase of salicylate poisoning,
- Uremia
- Methanol toxicity

# Signs and symptoms

- Headache,
- Confusion,
- Drowsiness,
- Increased respiratory rate and depth,
- Nausea, and vomiting,
- Peripheral vasodilation
- Decreased cardiac  output occur when the pH falls below 7.

# Management

- Blood gas analysis- ph level,
- Sodium bicarbonate level,
- Co2 and potasium  levels.
- ECG monitoring
- Sodium bicarbonate is administered in low pH below 7  treat the underlying cause
- Calcium gluconate is administered in chronic metabolic acidosis to prevent  tetany

## b) Metabolic alkalosis

Characterized by increased pH of above 7.5 and an increased sodium bicarbonate level

**Causes**

- Gastric fluid loss through vomiting or suctioning,
- Hyperaldosteronism
- Cushing's syndrome,
- Hypokalemia,
- Long term diuretic therapy,
- Overuse of antacids,
- Chronic ingestion of milk and calcium carbonate.

## Signs and symptoms

- Tingling of fingers,
- Depressed respiratory rate,
- Decreased motility,
- Hypertonic muscles ,
- Hypokalemia

## Management

- Blood gas analysis – level of ph is increased, the bicarbonate is high, the $CO_2$ is high since the pt is hypoventilitating
- Restoration of fluid volume
- In order for kidneys to excrete bicarbonate, NaCl is given
- Treat the underlying condition.

## c) Respiratory acidosis

- Could be either acute or chronic
- Characterized by pH less than 7.35

## Causes

- Conditions that lead to retention of co2 e,g.
- Acute pulmonary edema,
- Obstruction by foreign object,
- Atelectasis,
- Pneumothorax,
- Overdose of sedatives,
- Severe pneumonia
- Acute respiratory distress syndrome

## Signs and symptoms

- High pulse rate,
- Increased respiratory rate,
- Increased blood pressure,
- Mental  cloudiness,
- Feeling of fullness in the head.
- Cerebrovascular vasodilation  and increased cerebral blood flow,
- Increased intracranial pressure (icp)

# Management

- Blood gas analysis
- Improve ventilation by positioning or removal of obstructing body, put pt  on mechanical ventilator if very severe. Otherwise administer oxygen via mask
- Give medications which could address the cause e.g antibiotics, bronchodilator etc.
- Give fluids
- Monitor on ECG

## d) Respiratory alkalosis

A state when the arterial pH is greater than 7.45.

### Causes

- Extreme anxiety,
- Hypoxemia,
- The early phase of salicylate intoxication,
- Gram-negative bacteremia,
- Poor setting of mechanical ventilator machine

# Signs and symptoms

- Lightheadedness - decreased cerebral blood flow,
- Inability to concentrate,
- Numbness  and tingling  from decreased calcium ionization,
- Tinnitus,
- Loss of consciousness,
-  Tachycardia

# Management

- Investigations: Blood U&E- low potasium , decreased phosphate, hypercalcemia
- Relieve anxiety by reassurannce or sedation
- Treat underlying cause.

END